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ABSTRACT

The status of State management information systems (MISs) is documented in this study, in which interviews were conducted with MIS directors and senior administrators from agencies in the 47 participating States. Constraints to improving these systems are also described and recommendations are provided to the U.S. Office of Education (USOE) to facilitate MIS improvements. Chapter I contains an overview, the objectives, and the design of the study. Chapter II documents the current status of State MISs using a scheme developed for that purpose. Chapter III reports on the outcomes and benefits accruing to States that received part C grants from USOE for MIS purposes. Chapter IV describes reported constraints to improving MIS in the States. Chapter V lists recommendations for facilitating improvements in State MISs and the rationale for them. The appendixes include lists of consultants, State divisions of vocational education participating in the study, interviewers assisting with data collection at regional sites, and a copy of the letter to States describing interview procedures. (HD)

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Research and Development Series No. 126

MANAGEMENT INFORMATION SYSTEMS FOR VOCATIONAL EDUCATION: A NATIONAL STUDY

BEST COPY AVAILABLE

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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A Final Report
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U.S. DEPARTMENT OF
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THE CENTER MISSION STATEMENT

The Center for Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

FOREWORD

State divisions of vocational education need to operate comprehensive management information systems in order to generate relevant and timely information to plan, redirect, and monitor state programs of vocational education and respond to federal reporting requirements. This study was funded by the U.S. Office of Education, Bureau of Occupational and Adult Education. The findings that are described and the recommendations that are reported in this study are intended for two audiences - the states and the Bureau. In the first instance the states are provided with an alternative frame-of-reference for embarking on future efforts to upgrade their management information systems. Concomitantly, the Bureau is provided with information it requires for policy decisions relative to providing continuing leadership and support in assisting states that desire to improve their management information systems.

Invaluable assistance was provided by Mr. Jack Wilson, project officer, the Division of Research and Demonstration in the Bureau of Occupational and Adult Education. Acknowledgement is due to the many state directors and state staff persons who took part in the study; and especially for the willingness and constructive spirit in which they responded to inquiries regarding their MIS activities. Recognition is due also to the members of the study's two advisory panels and to the field interviewers who assisted in data collection. Significant contributions to the final product were also made by Harold Starr, project director; Michael Black, research associate; Kenney Gray, research associate; and other Center staff.

Robert E. Taylor
Director

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SUMMARY

There is a recognized need for state divisions of vocational education (SDVEs) to operate more advanced management information systems (MISs). The present study, funded by the U.S. Office of Education (USOE), Bureau of Occupational and Adult Education, documents the status of state MISs, describes constraints to improving these systems, and provides recommendations to USOE to facilitate MIS improvements.

Fifty-one states were invited to participate in the study and 47 agreed to do so. Interviews were conducted with MIS directors and senior administrators from these agencies. This report contains the findings of the interviews.

Chapter I contains an overview, the objectives, and the design of the study. Chapter II documents the current status of state MISs using a scheme developed for that purpose. Chapter III reports on the outcomes and benefits accruing to states that received Part C grants from USOE for MIS purposes. Chapter IV describes reported constraints to improving MIS in the states. Chapter V lists recommendations for facilitating improvements in state MISs and the rationale for them.

Major findings of this study are reported below, followed by a list of recommendations to USOE to facilitate improvement in state MISs. These recommendations are based on study data and are compatible with the intent and mandates of P.L. 94-482 that states use more data-based information to plan and evaluate state vocational education programs.

- No states were found to have totally comprehensive and adequate MISs as defined in this study.
- Only 5 states were found to have MISs that had a combination of very good data base, data processing, and report generating capabilities.
- Only 6 states had adequate or near adequate MIS data bases.
- Facilities data were found in the data base of only 15 states; program data were in the data base of only 7 states; only 4 states reported having community

data; and program cost data, essential for program planning purposes, were found in the data base of only 12 states.

- Only 9 states had adequate data processing systems and 8 states still depended on a manual system for managing their MIS data.
- Only 28 per cent of the states studied utilized the five basic types of output reports (transaction, profile, exception, analytic, and projection) considered essential for program planning, evaluation, monitoring, and reporting purposes.
- No state had even near-adequate system documentation or system assessment procedures, and only four states had training activities that could be considered as adequate or near-adequate.
- The major benefit reported by states receiving Part C grants from USOE in FY 1974 and FY 1975 to upgrade their MIS was "improved availability of data for program planning and/or evaluation."

The most frequently reported constraints cited by state staff to improving MISs were:

- Inadequate number of staff
- Inadequate cooperation by local education agencies (LEAs)
- Unclear or contradictory definitions
- Limited data access capability
- Poor computer center service
- Low priority on the computer
- Insufficient funds
- Inadequate support by SDVE administration
- Limited physical access to the computer

Study staff noted additional constraints to improvements in state MISs. These constraints were as follows:

- There appeared to be no generally accepted standards for use by states in defining a comprehensive or adequate MIS.
- States had different intended purposes for their systems.
- There was a need for many MIS managers to have more information about recent developments in MIS technology and for them to become more aware of how this technology provides alternatives in conceptualizing and operating MIS.

The following recommendations to facilitate improvements in state MISs were offered to USOE for consideration:

- Initiate actions to have performance-based competency profiles developed for use by states in recruiting new MIS staff and for assisting states to identify professional development needs of MIS personnel.
- Sponsor professional development workshops that focus on MIS technology and the uses of information in the management of vocational education for participation by state level administrators and MIS staff, and USOE regional office staff involved with state plans and accountability reports.
- Promote and support joint efforts with states for a planned system of inter-and intra-state exchanges of MIS staff persons as a means of providing these persons with a better awareness of current MIS developments and as a means of improving their existing professional skills.
- Commission and support the publication of periodic reviews and syntheses of literature dealing with educational MIS and encouraging the states to disseminate reports of their MIS activities and developments.
- Develop a program to disseminate the outcomes of federally funded MIS projects that have applicability and potential usefulness to the states.
- Initiate feasibility studies to determine if it is practical for states to implement more automated alternatives to the current practice of local schools manually completing state-initiated data collection instruments.
- Initiate studies, in cooperation with states to determine the most appropriate schedules for collecting various kinds of data for input into a state MIS that will have the least impact on local level data suppliers and will still provide adequate management useful information for the multiplicity of purposes for which information is needed.
- Initiate studies to determine how states of diverse size can use sampling methods to reduce the volume of data collection.
- Develop a set of uniform terminology and data element definitions that are required for numerical aggregation and comparability of data within and across states.

- Seek counsel from individuals representing local and state educational agencies whenever charges in uniform terminology and data element definitions are contemplated.
- Recommend to the National Association of State Directors of Vocational Education that it reconvene a panel to deal with the issue of uniform data definitions and terminology.
- Periodically assess the adequacy of uniform terminology and data element definitions as these are implemented by the states. USOE regional office staff might coordinate this assessment activity within each region.
- Convene a series of meetings to include staff from USOE, the National Center for Educational Statistics (NCES), and the states to seek solutions to issues resulting from incompatibilities in instructional program codes (e.g., USOE and HEGIS) and instructional and occupational classification codes.
- Commission publications that can enable state MIS staff to become better acquainted with the range of computer software technologies available to them, their requirements, and criteria that can be used to select among available packages.
- Fund, in collaboration with the states, periodic meetings for MIS technical staff for the purpose of information exchange about data management (e.g., computer software, operating environments, implications for the management and utility of data bases).
- Initiate meetings to involve the states, NCES, and USOE in cooperative efforts to determine how best to phase in those data base categories found to be absent from most state MISs (e.g., facilities, program costs) and that states are required to have in place in order to be responsive to the Vocational Education Data System (VEDS) as mandated under P.L. 94-482.
- Fund the development and field testing of prototype standards and formats for documenting and assessing state MISs and prototype guides for training state staff in utilizing the MIS.

Chapter 1

INTRODUCTION

The Education Amendments of 1976 (P.L. 94-482) directs the states to utilize more data-based information for planning and evaluating state vocational education programs than at any time in the past. The 1976 amendments also require that the U.S. Office of Education (USOE) collect a wide array of information from the states to produce for Congress analyses of the effectiveness and impact of federal funds allocated for vocational education programs.

To achieve these ends in the context of changing social, economic, and educational conditions, states need to have management information systems (MISs) in operation that can respond effectively to new and emerging federal and state data requirements and do so in a timely manner. This point is made in a recent USOE publication (Wilson, 1975) which stated:

> The vast complexities of administering a vocational education program at the state level suggests the need for a range of information which is current, accurate, immediately available, and in a form that can be understood and used by administrators. Unfortunately, such information or service is not currently available on any meaningful scale for the vast majority of state agencies.

USOE has been increasingly criticized for the lack of adequate and accurate data it has been able to secure from the states. The states, in turn, have been periodically criticized for failing to utilize data-based information as a basis for planning and evaluating state vocational education programs.

In spite of these circumstances there have been numerous federal and state cooperative efforts directed at improving the current state of affairs. The USOE, for example,

has utilized at least three different strategies to assist states to improve their MIS capabilities. The first strategy has involved sponsoring national meetings, seminars, and workshops which focus on MIS issues in vocational education. The second strategy has been to support MIS projects which have national significance. The third strategy has involved the authorization of grants to the states to assist them in developing, field testing, and implementing MIS or components of such systems in terms of their own unique state settings.

The Vocational Education Act (VEA) of 1963 and the subsequent amendments to that Act provide substantial federal direction and assistance to the states for the administration and operation of vocational education programs. Under this federal legislation the states are directed to engage in comprehensive planning and evaluation as a means of insuring that the purposes of the VEA will be achieved. The nature and scope of state planning and evaluation have been reaffirmed and made more explicit in the 1968 and 1976 amendments to the 1963 VEA.

One of the directives for planning and evaluation under the 1963 VEA was that the states shall develop a state plan for vocational education which the Commissioner of Education must approve before granting them federal funds. States were required to develop program plans only after periodically reviewing existing vocational education programs and current and projected manpower needs and job opportunities so that program offerings would be realistic in the light of actual or anticipated opportunities for gainful employment. Concurrently, the USOE was to continue to monitor the status of vocational education across the nation through its annual collection of data from the states.

In 1968, the National Advisory Council on Vocational Education assessed both the evaluation and planning efforts by the states. In its report, "Vocational Education: The Bridge Between Man and His Work," the Council found that:

- as nearly as we can determine only a very few states have conducted a formal evaluation of their programs since 1917...
- it is impossible to determine to our full satisfaction what has occurred under the Act...The regular reporting system was inadequate for the purpose... The only significant change in the reporting system as a result of the Vocational Education Act of 1963 was the reporting of expenditures and enrollments...
- it is the responsibility of federal leadership to (1) carefully design a system which will yield the pertinent information...(2) see that it is obtained accurately and on time, and (3) see that it is used for meaningful evaluation.

Partly in response to the Council's findings, the 1968 VEA amendments directed the states to engage in more detailed planning and evaluation of state programs, and the USOE prescribed new rules and regulations to the states for developing state plans. Until 1976, the state plans and the USOE reporting system continued to be the basic sources for producing evidence about the status, quality, effectiveness, and impact of all federally assisted vocational education programs.

A 1972 General Accounting Office (GAO) report to the Congress, "Training America's Labor Force: Potential, Progress, and Problems of Vocational Education," reported that state level evaluation of vocational education mandated under the VEA was seriously handicapped by a lack of management information. Problems associated with incomplete and inaccurate data available within the states surveyed were described in the report, and steps for the USOE to take to improve management information systems were recommended.

A 1974 GAO report to Congress, "What is the Role of Federal Assistance for Vocational Education?" again focused on

information system inadequacies of SDVEs. The report found that:

- the Congress has observed repeatedly that information about vocational education is inadequate for the purpose of formulating public policy and ascertaining whether current programs are working effectively....
- states administering programs authorized under VEA generally gather only that quantitative information required by OE....data collected to satisfy OE requirements do not contain information on the extent and type of need for vocational education on the part of individuals served or potential participants, nature and level of actual instructional programs, costs or specific programs, or results of programs in any terms other than initial placement....or.... for determining the extent to which state and local efforts actually had impacted on the handicapped, the disadvantaged, or those in economically depressed areas....
- data that would be helpful in planning is unavailable, inadequate, or underutilized.

As a result of its findings the GAO recommended to the Congress that the Secretary of HEW should:

- develop with the states an improved approach to planning which will better meet state needs as well as provide information necessary to monitor and evaluate adequately federal program expneditures....
- increase efforts in the development of vocational information systems that will provide data for comparative analysis, and continuously review the use of that data to improve vocational programs.

The need for states to have more advanced MISs in place has been made all the more urgent by the passage of the Education Amendments of 1976. These recently enacted amendments mandate that an extensive data base be used by the states to plan, evaluate, and account for the use of federal funds for vocational education programs. First, the amendments set out minimal substantive content and categories of information to be found in five year state plans and annual program plans and accountability reports which must be submitted for approval to the Commissioner of Education. Second, the

amendments prescribe categories of information which must be taken into account in federal and state evaluations of vocational education programs. Third, there is established a National Occupational Information Coordinating Committee which shall implement an occupational information system which shall include data on occupational demand and supply based on uniform definitions, standardized estimating procedures, and standardized occupational classifications. Fourth, a national vocational education data reporting and accounting system is mandated which will require states to provide data about students' characteristics, programs, program completers and leavers, staff, facilities, and expenditures.

If criticisms of state MISs are basically correct many of them might not be able to deal effectively with new and emerging 1976 VEA requirements without significantly upgrading their MISs. Thus, there is an opportunity and need for federal leadership and assistance to improve this situation.

Objectives of the Present Study

The USOE, in carrying out its responsibilities of providing assistance and leadership to the states, requested The Center for Vocational Education (CVE) to conduct a systematic study of MISs in operation, and under development, by the states. The objectives of this study were to:

- describe MISs in state divisions of vocational education in terms of their comprehensiveness and adequacy;
- identify those SDVEs whose MISs are most comprehensive and adequate;
- describe the impact of federal grants which are specifically authorized to assist states to improve their MIS capabilities;
- identify common constraints which seem to impede state from improving MISs;
- provide recommendations to USOE for improving the capabilities of state MISs to meet continuing, new, and emerging state and federal needs for data-based information.

Design of the Study

The review of each state MIS involved 5 activities. These were: a) formulating a scheme for describing the comprehensiveness and adequacy of state MISs, b) soliciting cooperation from the states, c) formulating interview procedures, d) conducting interviews, and e) analyzing the interview results. These 5 activities are briefly described in this section of the report.

Describing MISs

A scheme was formulated by project staff for describing the components of comprehensive MIS and the elements which define each component as adequate. This scheme is described more fully in Chapter III of this report. The conceptual scheme was formulated with assistance from a panel of consultants having expertise in either information system technology or vocational education administration at the state level. The panel personnel and their institutional affiliations are found in Appendix A.

Soliciting Cooperation from the States

All SDVE except for Guam, the Trust Territory of the Pacific Islands, the Virgin Islands, and American Samoa were contacted by mail to get them to participate in the study. Forty-seven of the fifty-two vocational education agencies contacted agreed to become involved in the interview procedures. A list of the cooperating states is found in Appendix B.

Formulating Interview Procedures

Procedures were developed for interviewing two levels of personnel: MIS managers and senior SDVE administrators. A decision was made that face-to-face interviews would be conducted with MIS managers in states receiving federal grants for state level MIS efforts in FY 1974 and/or FY 1975. It was decided that interviews with MIS managers in the balance

of states would be conducted by phone. All senior SDVE administrators were also to be interviewed by phone. These decisions were necessitated by the time and resources available for the interview procedures and the request by the USOE that emphasis be placed on assessing the impact of the federal grants.

Conducting Interviews

In addition to study staff, a team of 6 interviewers was temporarily employed and trained to assist with the face-to-face interviews. In most cases this allowed a team of 3 persons to interview the MIS directors and senior administrators from each state. Insofar as possible, each team reflected expertise in administration of state level vocational education, information system technology, and state education agency MIS operations. A list of these temporary project staff and their institutional affiliations are found in Appendix C. In all but a few instances of project staff were responsible for interviews conducted by phone.

The interviews themselves were open-ended with only the minimal structuring required to obtain the needed information within a reasonable time frame. Each participating state received a letter describing the structure of the interviews, (Appendix D).

Analyzing the Results

The results of the interview were recorded on forms designed for that purpose. The results were organized by: a) type of project studies (i.e., manpower information or MIS); b) funding source for the project (i.e., state or Part C); c) MIS component and its elements; and, d) category of constraint. Frequency counts were used to summarize the data.

On the basis of the analyzed results, study staff with assistance from an external panel (Appendix E) formulated a tentative set of recommendations to improve the current status

of state MISs for consideration by USOE. Study staff was responsible for the final list of recommendations found in Chapter V of this report.

Chapter II

THE STATUS OF MANAGEMENT INFORMATION SYSTEMS IN STATE DIVISIONS OF VOCATIONAL EDUCATION

Describing A Management Information System

Study staff, with assistance from a panel of consultants, conceptualized a scheme for describing the comprehensiveness of a MIS and the adequacy of its components within the operating context of a SDVE. A comprehensive MIS was defined as one that had 6 interrelated and interdependent functional components. For the purposes of this study each of the 6 components was regarded as equivalent in terms of impacting on overall system functioning. The adequacy of a MIS component was defined by its elements and the extensiveness, complexity and level of technical sophistication of the elements. A totally adequate MIS had first to meet the test of comprehensiveness - having all 6 functional components. Then, all components had to have mandated attributes which met prescribed standards.

Obviously, the more stringent the standards for MIS comprehensiveness and adequacy, the less likely it is that states will be able to achieve the standards set, and vice-versa. Standards for achieving MIS comprehensiveness and adequacy were deliberately set high. The fact that many states might not reach these standards, is, therefore, not an indictment of current systems.

A comprehensive MIS can be described in terms of six functional components. Three functional components--data input, data processing, data output--are the systems operating components. They are the components that make the system work, and address the most basic functions of the system: what information goes in, how the information is managed, and what information comes out. All three are essential. If any one is missing, there is no management information system.

The three other functional components--documentation, training, assessment--are system support components. They serve to enhance the systems efficiency and effectiveness, but are not always a requirement. Their primary purpose is to provide procedural standardization, continuity across changes in personnel, and flexibility to respond to changing requirements. In a completely static, (and completely unrealistic) environment in which requirements never changed and there was no personnel turnover, the need for support functions would be minimal; but in the fluid environments that actually exist, lack of support functions can drastically impair operating effectiveness.

Findings

The management information systems operated by the state divisions of vocational education will be described in terms of these 6 components. For each component, a description of its elements and an assessment of the adequacy of state MISs are presented.

Data Input Component

The data input component of a MIS consists of: a) the identification and definition of the elements upon which data are collected (the data base), and b) the instruments and procedures for collecting the data. Only the data bases were examined as part of the scope of work of this project.

There are many categories of data that a vocational education MIS might contain: student, staff, cost, program, facilities, manpower, community and demographic, and information about occupations.

Student data is information about the students currently or previously enrolled in the school system. This data could include enrollment counts, follow-up information, information about program completion and placement, student characteris-

tics such as race, sex, and disadvantaging or handicapping conditions, and information about students interests in educational programs. Students data may be recorded by individual student or aggregated in some form.

Staff data is information about administrative and instructional personnel and could include current assignments, credentials, salaries, and educational background. Cost data is information about allocations and expenditures for vocational education purposes. Program data is information describing instructional programs. This data could include information about course offerings, student contact hours per week, advisory committee makeup, and services provided to those with special needs. Facilities data could include information about physical plant and equipment, such as location and space requirements, and types of equipment available. Manpower information is basically supply and demand information for various jobs. Community and demographic data is information concconcerning characteristics of geographic areas such as population characteristics, types of industry, and inward and outward migration of industry and populations. Information about occupations would include job descriptions such as the waqes, educational requirements, and working conditions for different occupations.

To be adequate a state's data base needed to contain, at a minimum, those categories of data which are essential for program planning, evaluation, monitoring, and accountability reporting. In the judgment of project staff this mandated the inclusion of six categories of data: student, program, facilities, cost, staffing, and manpower.

The student category had to contain 5 sub-categories of student data: enrollment, placement, follow-up, completions, and students' characteristics. Also, in order to facilitate further analyses, data had to be collected and stored about individual students, and not solely in the aggregate.

A state's data base was considered to be minimally adequate if it contained all six categories, and to be near-adequate if it contained any five of the six. As indicated in Table 1, only 1 state (2%) had an adequate data base. Only 6 states (13%) had data bases which are at least near-adequate. The 5 near-adequate states were also missing some sub-categories of student data, and some of them did not collect data by individual student.

The most common category of data found in a state's data base was student data, with all states having at least student enrollment (Table 2). Manpower (60%) and staff (51%) data were also found in a majority of the states. Only 32% of the states had facilities data, and not more than 15% of the states had the two remaining categories required for minimal data base adequacy (i.e., program and program costs). One of the most critical categories for program planning purposes--program costs--was found in only 2 states (4%).

Eight states reported that they had dropped certain data elements that they used to collect, but none reported dropping any whole categories of data. The major reasons given for deletions in the data were: not needed by the state, made the data collection forms too complex, conflicted with Privacy requirements, and was no longer required for federal reporting purposes.

Data Processing Component

The data processing component of a MIS consists of the procedures and equipment (including computer programs) used for accessing and updating the data. The measure of the adequacy of such procedures is its efficiency (i.e., the ease and rapidity with which needed output can be produced.

There are four basic data processing systems in common use and these can be ordered from least to most efficient. These systems are: manual, mechanized, output-oriented automated, and data-oriented automated.

Table 1

NUMBER AND PERCENT OF STATES WITH ADEQUATE
OR NEAR-ADEQUATE FEATURES

Data Base	No. of States	% of States
Adequate	1	2
Near-Adequate	5	11
Total States	6	13
Data Processing		
Adequate	9	19
Data Output		
Adequate	12	26
Near-Adequate	1	2
Total States	13	28
Documentation		
Adequate	0	0
Near-Adequate	0	0
Total States	0	0
Training		
Adequate	1	2
Near-Adequate	3	6
Total States	4	8
Assessment		
Adequate	0	0
Near-Adequate	0	0
Total States	0	0

Table 2

FEATURES OF MIS COMPONENTS

Data Base	No. of States	% of States
Student Enrollment	47	100
Student Placement/Follow-up	46	98
Student Completion	43	91
Student Characteristics	40	85
Cost/Expenditures (Fed. Reimbursement)	29	62
Manpower	28	60
Staff	24	51
Facilities	15	32
Program	7	15
Occupational Information	6	13
Community Information	4	9
Program Costs	2	4
Student Interest	0	0
Payroll	0	0
Total States	47	100
Data Detail		
Student Aggregate Only	33	70
Student Individual or both	23	49
Total States	47	100
Data Processing System		
Manual	8	17
Mechanized	0	0
Output-Oriented Automated	30	64
Data-Oriented Automated	9	19
Total States	47	100

Table 2 (Continued)

Data Output	No. of States	% of States
Transaction Reports	47	100
Profile Reports	27	57
Analytic Reports	17	36
Exception Reports	16	34
Projection Reports	13	28
Other Reports	6	13
Total States	47	100
Hardware Support		
Large Main Storage (224K+)	27	57
Medium Main Storage (64K-192K)	11	24
Small Main Storage (4K-32K)	2	4
No Computer	7	15
Total States	47	100
Documentation		
Data Input Procedures	44	94
Data Management Operations	11	23
General Description of MIS	5	11
Training Materials for MIS Users	2	4
Training Materials for Data Suppliers	1	2
General Description of Manpower Forecasting System	1	2
Total States	44	94
Training (Purpose)		
Completing Data Collection	35	74
Use of MIS Output	9	19
MIS Operation and Maintenance	6	13
Improving Management Decision-Making	1	2
Other	1	2
Total States	38	81

Table 2 (Continued)

Training (Audiences)	No. of States	% of States
LEA Data Suppliers	33	70
LEA Data Users	9	19
SDVE Management	8	17
MIS Staff	8	17
SDVE Clerical Staff	4	9
Other Data Suppliers	3	6
Other Data Users	2	4
Total States	38	81
Assessment Plan		
Written Plan Exists	0	0
Assessment (Component Assessed)		
Data Input	15	32
Data Output	8	17
Data Processing	5	11
MIS Training	2	4
Documentation	2	4
Assessment Procedures	1	2
Total States	15	32

In a manual system, data is stored on paper forms, either the original data collection instruments or some form of abstracts or transcriptions. Data access and update is accomplished by an individual searching through the files to find the needed information. Except for the very smallest of data bases, this is the least efficient of all data processing systems, and totally unworkable with data bases of any appreciable size.

A mechanized system is one which utilizes some type of machinery to aid in accessing the data. Card sorters and tabulating machines are the most common examples. Data is kept on punched cards. The cards are run through the machines when information is needed, with appropriate switch settings or plug-in wires used to indicate what cards are to be selected. This system is also suitable only with very small data bases. Though faster than manual systems, it is still very slow by current standards. The number of ways in which the machines can be programmed is extremely limited.

An automated system is one which utilizes electronic computers. Data is stored on magnetic tape, on magnetic disk, or similar devices. A computer can be programmed in nearly limitless ways to access, update, combine, and analyze the data with extreme rapidity.

The difference between output-oriented and data-oriented automated systems is in the type of programming utilized. The output-oriented approach to the creation of information systems involves first a needs analysis. A particular information need is identified. A program to create a file is written and tested and the file created. A program is written to update the file. Another set of programs is then created, tested, and operated to produce additional information from the file. To each new information requirement a cycle of problem definition, study of alternatives, design, programming, testing and operation must take place. This is relatively

slow, cumbersome, and time-consuming. By the time the information is produced, the original requirements may have changed or disappeared altogether. For example, the data processing section of an educational agency might have programs to create, maintain, and retrieve information from student files, staff files, etc. Whenever some event takes place - a teacher quits, is hired, is reassigned - it will affect one or more files. Merely managing the maintenance function for a complex of fragmented programs is in itself a tremendous job. Seemingly minor changes in the programs - for example, changing the field length in a particular record, or redefining a data element - can have devastating effects throughout the system. If a question is asked that was not anticipated in the system design, it may be next-to-impossible to answer without spending much time and effort writing special programs. The whole system is input-output dependent: the output is severely limited by the format of the input and the design of the programs to produce the output. The system can work well for the specific tasks that it was originally designed to do, but it has limited flexibility. It cannot easily handle unanticipated needs.

The key to the data-oriented or generalized data-based management approach is input-output independence. The input, the data elements used in the system, is determined only by consideration of the kinds of information one wishes to have available. Output need not be determined until the need for the output arises. Suppose that a state director of vocational education decided that he needs to know the cost per student per instructional hour for the agricultural production program in District X, or that he wants to locate all districts in which the average salary for teachers with more than 10 years experience is less than $8,000 per year. In an output-oriented system there would be no way to answer these questions unless they had been designed into the report generating pro-

grams, or someone spends considerable time writing a special program. In a data-oriented system, commands for retrieving the information could easily be formulated at the time the question was asked, as long as the information was contained somewhere in the data base (no system can be totally input-output independent). The cost per student, for example, could not be determined if the data base contained no cost data.

A data-oriented system achieves its input-output independence through the use of one of two types of computer programs: a generalized information-retrieval system (GIRS), or a generalized data-based management system (GDBMS). There are a number of both types available from commercial software vendors, and some have been developed by universities and government agencies. The GIRS and GDBMS serve similar purposes, but the latter is considerably more sophisticated and flexible, and achieves input-output independence to a greater degree, than does the former. Both accept instructions, or commands, when they are executed, so that the desired output need not be known ahead of time.

In an output-oriented system, no generalized computer program is used. Typically, a variety of programs are written "in house" to generate specific predetermined reports. These programs are referred to as standard, or "canned" programs. They generally do not accept instructions when executed, and so, can generate only the output that they were designed to generate. Similar programs written to respond to requests for atypical information, for which a standard program does not exist, is called an "ad hoc" program.

A state was considered adequate if it had a data-oriented automated system. Unlike the other six categories a state was considered to be either adequate or inadequate in data processing. In all other categories, the difference between the best and the next-best is a matter of degree, (e.g., one category

less of data, or one less report). In the case of data processing, the difference between data-oriented systems and output-oriented systems is a qualitative one; that, the latter simply cannot do what the former can. While both the output-oriented systems and the data-oriented systems can produce, update, and analyze information rapidly, only the latter contains the flexibility needed to respond to unanticipated and changing needs, as is generally the case in vocational education. The output-oriented systems will function efficiently only in a static, unchanging environment, where all information needs are known.

The data processing situation in the states was only slightly better than the data base situation. Nine states (19%) had adequate data-processing systems; that is, data-oriented automated systems. Thirty states (60%) had output-oriented automated systems either fully-implemented or implemented for a substantial part of their data base. Eight states (17%) still used a manual system exclusively. No state used a mechanized system.

Hardware support was generally good. Thirty-eight states had a computer with at least 64K bytes of main storage, the minimum size needed to run a data-oriented system. Two states (4%) had only small computers, and 7 (15%) used no computers.

Data Output Component

The data output component consists of the various reports which are generated by the MIS. There are five basic types of reports: transaction, profile, exception, projection, and analytic.

Transaction reports consist of simple enumerations or summaries of data; (e.g., enrollments within a program, expenditures by purpose.) Such reports are needed primarily to monitor the status of vocational education operations, and for accountability purposes. They are the most fundamental

and common type of report.

Profile reports are comparisons, within one class of data, between several areas of concern; (e.g., program enrollment broken down by urban vs. rural.) Reports of this type are used for such purposes as selective allocation of resources and evaluation. It may be desired, for example, to channel funds to districts with the lowest per capita funds available for vocational education, or to compare achievement levels in one part of the state with another.

Exception reports isolate data values which deviate from some prescribed standard or "normal" range. Determining which teachers are teaching programs for which they are not credentialed, or locating districts in which mean achievement level is below a specified norm are examples of this type of report. Exception reports are used mainly for "trouble-shooting". The existence of deviations from standards usually indicates a problem which needs to be identified and corrected.

Analytical reports provide computational breakdowns relating two or more dissimilar classes of data; (e.g., cost of instruction per student with instructional costs being one class, and student enrollment counts being the other.) They can range from simple analyses, such as the previous example, to very sophisticated and complex analyses, such as determining the relationships between teacher competencies and achievement of the students.

Projection reports are estimates of future values based on the present values of some data, or based upon the results of analytic reports. Examples are estimates of future program enrollments, estimates of future manpower supply and demand for various jobs, and estimates of future program costs. The major need for projection reports is to supply estimates of future values for program planning, setting of long-range objectives, forecasting future needs, and policy formulation.

Other types of reports, though less common, may also exist such as narrative summaries.

All five basic types of reports are essential if a state is to have capabilities for planning and evaluation, monitoring, and reporting. It must be able to monitor its current status, compare various parts of its operation, locate trouble spots, estimate future needs, and analyze data to answer questions about the interrelationships among information items. A state was considered to have an adequate output component if it generated all five types of reports, and near-adequate if it generated any four.

The adequacy of the states' output component was somewhat better than their input and data processing components. Twelve states (26%) had adequate data output (Table 1). An additional 2 had near-adequate data output; thus, 28% had at least near-adequate data output.

It may seem paradoxical that more states had adequate output components than had adequate input components, since no system can output what it doesn't have in the system. There is no paradox here, however, if it is kept in mind that assessment of the input component and the output component are based on the variety of information gathered, whereas the adequacy of the output components is based on what is done with that data. It is thus possible for a state to collect only enrollment and program data, giving it a very inadequate data base, yet do a large variety of manipulations with these data and generate all of the critical types of reports.

Transaction reports were found universally (Table 2). Profile reports were the next most common, with 57% of the states producing them. The other three basic reports were produced in 28% - 36% of the states. Other types of reports were produced in only 13% of the states.

Documentation

The documentation component of an MIS consists of all of the printed information about the system which is maintained. Documentation provides standardization of operations by making available to MIS personnel a common set of information about the MIS functions and procedures. It also provides system continuity when there are changes in personnel. New personnel have a reliable reference source which does not depend upon the availability of predecessor personnel.

While the different kinds of documentation that might be kept is almost limitless, certain major functions must be documented. These are: a general description of the MIS, and procedures for data input and data management operations. In addition, training materials for MIS managers, data suppliers, operatives, and users must be available. States which have all 7 major elements of documentation are considered adequate; those with any 6, near-adequate. As is obvious from Table 1, no state came even close. The maximum any state had was three. The most common element was data input procedures, which 44 (98%) of the states had. After that, the percentage drops off sharply, with 11 states (23%) having documentation on data management procedures, and 5 states (11%) having a general description of the MIS. Only 4 (8%) states had any other form of documentation.

Training Component

The purpose of training is to involve and teach needed skills to new staff involved with the MIS operation and maintenance. The teaching of other functions, such as use of MIS output or filling out data collection instruments might also be useful, but is not central to the on-going operation of the MIS. Three classes of personnel are closely involved with MIS operations: the MIS staff, state division of vocational education management personnel, and those clerical staff of the SDVE who are involved in MIS. A state with a MIS operation

and maintenance training program designed to serve the three specified audiences was considered to have an adequate training program; if one class of audience was missing, the training program was considered near adequate.

Only 1 state (2%) had an adequate training program. Including 3 states with near-adequate training programs, a total of 4 states (9%) had at least near-adequate training programs.

A number of states which had no training in MIS operation and maintenance did have training in other areas. Thirty-five states (74%) offered training to data suppliers in filling out data collection forms. Nine states (19%) offered training in the use of MIS output, while 1 state (2%) offered training to management personnel in improving management decision-making.

The form of the training programs, regardless of their content, was most commonly a workshop or seminar lasting one-half to two days.

Assessment Component

The purposes of assessing an MIS are to make improvements in the system and to modify the system, when necessary, to respond to new requirements. In order to adequately perform this function, an assessment plan must exist and must provide for assessing at least the three MIS operating components. Without an assessment plan, "ad hoc" assessments may still take place but its informal nature casts doubt on their validity.

No state had a formal assessment plan, though some did engage in informal assessment in some areas. Fifteen states (32%) had informal assessments of the data input component, 8 states (17%) of the data output component, and 5 states (11%) of the data processing component. Only two states did any assessment of the support components, and these were of an "ad hoc" nature.

These informal assessment efforts were most often some form of periodic review by a committee or management team.

Overall Assessment of State MISs

In interpreting the overall assessment of state MISs, two facts must be kept in mind. First, the assessment of each state's MIS was based on the verbal responses provided by state staff, and no attempt was made to verify the accuracy of the responses. Second, the assessment was dependent on the use of a scheme for describing a MIS that was formulated by study staff.

It is apparent that the state MISs studied were neither comprehensive nor adequate within the framework of the standards set by the project. The only real strength was in hardware support. The use of at least a medium-sized computer in 81% of the states indicates that availability of computer facilities is not a serious problem though poor service and lack of ready access was often found to be a constraint to their use. Even in states which do not use computers, there were usually computers available which could be used. The operating components were, on the average, quite inadequate, with only 28% of states having at least near-adequate data output, 19% having adequate data processing, and 13% having at least near-adequate data bases. Support components were almost non-existent. No state had even near-adequate documentation or assessment, and only 8% had at least near-adequate training.

Despite a lack of total system comprehensiveness or adequacy as defined in the present study, the reported comments by state staff indicated that five states had very good operating components. All were adequate in at least one operating component and near-adequate in the other two. These states were Colorado, Iowa, Oklahoma, Minnesota, and Wisconsin.

The Center's Management Information System for Vocational Education (MISVE) was completed under a FY 1975 Part C contract. This system was not included in the review as it was not a "state" MIS. Nevertheless, in spite of what is seemingly a self-serving comment, study staff believe that MISVE is at least as comprehensive and adequate a system (if not more so) than the other five identified state systems.

Chapter III

IMPACT OF PART C VOCATIONAL EDUCATION PROJECTS

This chapter describes the actual and anticipated outcomes and benefits reported to study staff for 18 state level MIS and 6 manpower information projects funded with grants from USOE during FY 1974 and FY 1975 under provisions of Part C of the VEA of 1963, as amended. In some cases these projects were designed to upgrade existing MIS and manpower information systems and components of such systems. In other cases, the intent of the project was to implement new features. The accomplishments for the MIS projects are described first, followed by the accomplishments for the manpower projects.

Accomplishments of Part C Management Information System Projects

Summary of Outcomes and Benefits

- eighteen Part C MIS projects reported 21 different outcomes. The most frequent outcomes were changes in data input (data instrumentation and data collection procedures) and data processing (EDP software) components
- the 18 MIS projects reported 9 different benefits. One of these was reported by a substantial number of states--improved availability of data for planning and/or for evaluation.

Analysis of Data

Each project provided 1 to 10 accomplishments, either actual or potential. At the time the survey was conducted, the FY 74 projects were completed, but the FY 75 projects were not scheduled for completion until 3 to 6 months later. All FY 74 accomplishments, with one exception, were actual. That one discontinued its project at its expiration, resulting in no permanent accomplishments or benefits which were identified to project staff. FY 75 accomplishments were mostly potential;

but since the projects had not yet been completed, this is not a negative finding.

Each state, with the one exception cited, reported one to three benefits resulting from its accomplishments, and benefiting 1 to 5 agencies. Most benefits were reported as potential. This is to be expected, since it takes time for an accomplished objective to result in actual benefits.

The most wide-spread accomplishments were on data input with 15 states reporting accomplishments in this area (Tables 3 and 4). These were mainly for implementing data collection instruments (7 states) and implementing data collection procedures (6 states). Three states reported upgrading data collection instruments; 2 states reported upgrading data bases; and 3 states reported either upgrading or implementing the identification of information needs.

Eleven states reported accomplishments in the data processing component of their MIS. This was primarily for upgrading and implementing software (8 states) and data processing services (5 states). Other accomplishments were upgrading and implementing data processing equipment (3 states), operating procedures (2 states), accounting systems (1 state), and manpower forecasting models (1 state).

Eight states reported accomplishments in the data output component. These were mainly implementations of new standard reports (5 states). Three states reported upgrading of existing reports.

Accomplishments in the MIS support components were less common, and all were implementations. Four states reported assessment component accomplishments. Three states began informal assessment efforts, with 1 devising an informal assessment plan, and 2 of the 4 states assigned to monitor the MIS operations.

Table 3

IMPACT OF PART C FUNDS
MIS PROJECTS SUMMARY

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Outcomes						
Data Input	6	4	6	8	15	12
Data Processing	4	4	8	7	11	10
Data Output	3	3	6	6	8	6
Assessment	0	0	4	3	4	3
Documentation	0	0	5	4	5	4
Training	0	0	5	5	5	5
Benefits of Part C Funding					18	11
Benefiting Agencies					18	11

Table 4

IMPACT OF PART C FUNDS
MIS PROJECTS

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Outcomes						
Data Input						
Instruments	3	2	7	7	10	9
Data Collection Procedures	2	1	6	6	8	7
Information Needs Identification	1	0	3	1	4	1
Data Base	2	2	0	0	2	2
Total Projects	6	4	8	8	15	12
Data Processing						
Software	1	1	4	4	5	5
Services	2	2	1	1	3	3
Equipment	0	0	2	2	2	2
Operating Procedures	0	0	1	1	1	1
Accounting System	0	0	1	1	1	1
Manpower Forecasting Models	1	1	0	0	1	1
Total Projects	4	4	7	7	11	10

Table 4 (Continued)

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Data Output						
Standard Reports	2	2	5	4	7	6
"ad hoc" Reports	2	2	0	0	2	2
Interactive Reports	1	1	0	0	1	1
Models for Use of MIS Output	0	0	1	0	1	0
Total Projects	3	3	6	6	8	6
Assessment						
Informal Efforts	0	0	3	3	3	3
Monitoring Committees	0	0	2	2	2	2
Assessment Plan	0	0	1	0	1	0
Total Projects	0	0	4	3	4	3
Documentation						
Data Input Instructions	0	0	4	4	4	4
Instructions for MIS Operations	0	0	2	2	2	2
General Description	0	0	1	1	1	1
Instructions for Output Users	0	0	1	0	1	0
Total Projects	0	0	5	4	5	4

Table 4 (Continued)

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Training						
LEA Administrators	0	0	4	4	4	4
SDVE Professional Staff	0	0	4	4	4	4
SDVE Administrators	0	0	3	3	3	3
LEA Teachers	0	0	2	2	2	2
SDVE Clerical Staff	0	0	1	1	1	1
Total Projects	0	0	5	5	5	5
Benefits of Part C Funding						
Improved availability of data for state and regional planning and evaluation					11	6
Improved data retrieval/reporting/ update capability					7	4
Improved data collection capability					4	2
Increased awareness/usage of computers by state staff					2	2
Improved financial management					2	1
Increased awareness of users needs by EDP staff					1	1
Improved availability of data for state and federal reporting					1	1
Improved guidance services					1	1
Improved data availability for curriculum planning					1	0
Total Projects	18	11				

Table 4 (Continued)

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Benefiting Agencies						
State Division of Vocational Education					20	11
Local Education Agencies					19	10
U.S. Office of Education					11	9
Other State Agencies					4	1
Other Federal Agencies					2	1
Other Agencies					2	1
Private Agencies					1	0
Total Projects	18	11				

Five states had documentation accomplishments. Four of these states developed instructions for filling out data collection forms, 2 of the 5 states produced instructions for operation of the management information system, and 1 produced instructions for use of MIS reports.

Five states implemented training programs for SDVE administrators and professional staff, and/or local education agency teachers and 1 of the 5 states for SDVE clerical staff.

A total of 9 different benefits were reported as accruing from the accomplished objectives; but only 3 had any appreciable distribution over more than 1 state (Tables 3 and 4). Eleven states reported that the availability of data for state or regional planning and/or evaluation would be improved. Seven states reported that their capability to retrieve, update, and report information would be improved, and 4 states reported that they had improved their data collection capability.

Six agencies were reported as beneficiaries of the project accomplishments. The most frequently reported were state divisions of vocational education (20 states), local education agencies (19 states), and the U.S. Office of Education (11 states). Other beneficiaries (miscellaneous, and state, federal, and private agencies), were reported by 5 or fewer states.

Accomplishments of Part C Manpower Projects

Summary of Outcomes and Benefits

- six Part C manpower projects reported 8 quite diverse outcomes and 6 different benefits, no more than 2 of which were reported by any one state.

Analysis of Data

Manpower projects were studied in 6 states. A total of 8 accomplishments were reported, widely distributed among the 6 projects. All but one, upgrading of a general purpose manpower system, were new implementations. Tables 5 and 6 present the distributions of accomplishments by number of states.

Six different benefits were reported by the 6 projects (Table 6). Again, they were widely distributed, with no particular ones being predominant.

The major beneficiaries reported were state divisions of vocational education (6 states) and local education agencies (5 states). Only 1 reported the U.S. Office of Education as a beneficiary, with 1 reporting miscellaneous agencies as beneficiaries.

Table 5

IMPACT OF PART C FUNDS
MANPOWER PROJECTS SUMMARY

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Outcomes	1	1	5	4	6	5
Benefits of Part C Funding					6	5
Benefiting Agencies					6	5

Table 6

IMPACT OF PART C FUNDS
MANPOWER PROJECTS

	Upgrading Projects		Implementation Projects		All Projects	
	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Outcomes						
Manpower projection system for program planning	0	0	2	2	2	2
Manpower data supplied to LEA	0	0	1	1	1	1
General purpose manpower system	1	1	0	0	1	1
Assessment of demand projection techniques	0	0	1	1	1	1
Analysis of manpower demand for rural counties	0	0	1	1	1	1
Manpower supply/demand reporting system	0	0	1	1	1	1
Development of Manpower projection models	0	0	1	1	1	1
Integration of manpower projection system in MIS	0	0	1	0	1	0
Total Projects	1	1	8	7	9	8
Benefits of Part C Funding						
Improved program planning capability					2	1
Improved management decision making					2	0

Table 6 (Continued)

	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes	Total Projects	Projects with Accomplished Outcomes
Benefits of Part C Funding (cont.)						
Improved manpower information availability					1	1
Improved demand projection techniques					1	1
Job placement service for rural counties					1	1
Improved curriculum planning capability					1	1
Total Projects					6	5
Benefiting Agencies						
State divisions of vocational education					6	4
Local education agencies					5	3
Other state agencies					1	1
U.S. Office of Education					1	1
Other federal agencies					1	1
Private agencies					1	1
Other agencies					1	1
Total Projects					6	5

Chapter IV

PERCEIVED CONSTRAINTS TO IMPROVING STATE MANAGEMENT INFORMATION SYSTEMS

This chapter of the report deals with constraints to improving state MISs. The first section in this chapter provides a brief overview of the methodology used to collect data about constraints and the reasons for its selection. The second section in this chapter provides the findings and analyses by study staff of constraints which were reported by MIS managers and senior SDVE administrators.

Overview

Two approaches to gathering data about states' constraints to improving MIS were considered. The first approach would involve developing a list of constraints derived from a review of relevant literature and expert judgments, and having state staff respond to the importance or relevance of each of the constraints listed. The second approach would be to conduct open-ended, semi-structured interviews providing state staff with the widest latitude to specify and elaborate about factors which they perceive as impeding improvement in MIS developments in their state.

The first approach lends itself more easily to quantitative analyses. The meaningfulness of results are reduced, however, by any lack of completeness in the set of constraints and response choices offered. The second approach has the advantage of eliciting constraints and their interrelationships which are most salient and compelling to the respondent. Quantification of results are, however, more difficult to achieve and the identification of constraints can be influenced by subjective impressions of interviewers.

A decision was made by the study staff to use the open-ended, semi-structured technique. It was believed that this choice would provide a more in-depth understanding of constraints faced by states in improving their MIS. Because of the more subjective nature of this approach several techniques were used to improve the accuracy of the findings. These techniques included the use of multiple interviewers during each interview, and subsequent follow-up with respondents to reconcile data differences between interviewers.

Forty-three of the 47 states participating in the study reported approximately 350 statements associated with constraints, problems, and operating difficulties in improving their currently operating[1] MIS. Four states did not report constraints. Of these 4 states, 3 were unable to adequately describe constraints because of internal SDVE reorganization or staff turnover, and 1 state reported they had no constraints.

The total list of statements was then reviewed to select out constraints from problems and difficulties. The constraints were then reviewed for degrees of similarity, overlap, and logical relatedness. This review produced 51 different constraints which seemed to logically fall into 9 categories.

Based on comments by the states, project staff also assigned each constraint to one or more MIS component feature(s) or condition(s) on which the constraint impacted. These features and conditions included the 6 MIS components (data input, data processing, data output, documentation, training, and assessment), MIS utility, and conditions external to the MIS that impacted on MIS implementation, administration, and operations (e.g., cooperation by data suppliers, support from SDVE administration).

[1] Part C projects were not included here because only 2 states reported 1 constraint each to achieving Part C project objectives.

The data about constraints secured from the interview process are summarized in Tables 7 through 10. These tables contain frequency counts for the perceived constraints, the kinds of impact the constraints have on a MIS, and by number of states and by constraint category. The findings which are reported in this section of the chapter are derived from analyses of the frequency count data reported in these tables.

Findings and Analyses of Reported Constraints

Constraints to Improving the MIS Data Input Component

Summary of findings

- more states report constraints to improving the MIS data input component than report constraints to improving any other MIS feature or component
- the most frequently reported constraints to improving the MIS data input component were inadequate cooperation by LEAs who supply MIS data (13 states), and unclear or contradictory definitions of terms which confuse data suppliers and ultimately affect the validity of data output (11 states)
- sixteen (37%) of the 43 states reporting 1 or more constraints reported no constraints to improving the MIS data input component.

Analysis of the Data

Twenty-seven states (63%) reported a total of 21 constraints which would impact on improving the MIS data input component. Organizational and data collection constraints accounted for 17 of the 21 reported constraints. Only 2 constraints to improving data input components occurred with any frequency. Thus, nearly half of the 27 states (13) reported that improving data input was constrained by inadequate cooperation by LEAs. Eleven of the 27 states reported that unclear or contradictory definitions of terms constrained data input improvement. From another perspective, 30% of all of the states (13 of 43) reported inadequate LEA cooperation, and

Table 7

CONSTRAINTS IMPACTING ON MIS COMPONENTS

Constraint Category	MIS Component					
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
1. Organization	14	10	1	1	0	0	25
2. Staffing	24	2	4	1	1	1	33
3. Data Collection	5	17	0	3	0	0	25
4. EDP Service	3	1	12	12	0	0	28
5. EDP Software	0	0	2	10	0	0	12
6. Data Base	1	1	0	1	0	0	3
7. Funding	1	1	1	0	0	0	3
8. EDP Hardware	0	0	1	2	0	0	3
9. Security	0	0	0	0	0	1	1
Total	48	32	21	30	1	2	134

Table 8

CATEGORIES OF CONSTRAINTS IMPACTING ON MIS CONPONENTS
NUMBER OF CONSTRAINTS REPORTED

Constraint Category	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
1. Organization	[illegible]	5	2	3	0	0	10
2. Data Collection	[illegible]	12	[illegible]	[illegible]	0	[illegible]	[illegible]
3. Data Base	0	1	0	3	0	6	8
4. Staffing	5	1	2	1	1	[illegible]	[illegible]
5. Reports	0	0	0	0	0	[illegible]	[illegible]
6. EDP Service	[illegible]	1	[illegible]	[illegible]	0	0	[illegible]
7. EDP Hardware	[illegible]	0	[illegible]	[illegible]	0	[illegible]	[illegible]
8. EDP Software	[illegible]	0	[illegible]	[illegible]	0	0	[illegible]
9. Funding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 9

CONSTRAINTS IMPACTING ON MIS COMPONENTS
NUMBER OF STATES REPORTING

Organization	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
1. Inadequate cooperation by LEAs	1	13	0	0	0	0	14
2. Inadequate support by SDVE and SDE administration	1	1	0	0	0	0	2
3. Inadequate support by SDE administration	1	1	0	0	0	0	2
4. Slow instrument clearance	1	1	0	0	0	0	2
5. Not enough time to improve MIS	1	1	0	0	0	0	2
6. SDVE resistance to computerization	1	1	1	0	0	0	3
7. Inadequate management understanding of MIS	1	2	0	0	0	0	3
8. MIS unit too low in organization	1	1	0	0	0	0	2
9. Staff doesn't trust system or data	1	0	0	0	0	0	1
10. Inadequate staff interest in MIS	1	2	0	0	0	0	3
11. Competition between SDVE and SDE MISs	1	0	0	0	0	0	1

Table 9 (Continued)

CONSTRAINTS IMPACTING ON MIS COMPONENTS
NUMBER OF STATES REPORTING

	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
8. USOE codes prohibit follow-up of post-secondary students	0	1	0	0	0	0	1
9. Reluctance of post-secondary students to identify ethnic background	0	1	0	0	0	0	1
10. Inadequate data collection procedures	0	1	0	0	0	0	1
11. Data collection is too expensive	0	1	0	0	0	0	1
12. Takes too long to get approval to collect new data	0	1	0	0	0	0	1
Total	0	17	0	1	0	1	19
CDP Service							
1. Poor computer center service	0	1	0	0	0	0	0
2. Low priority on computer	0	0	0	0	0	0	0

Table 9 (Continued)

CONSTRAINTS IMPACTING ON MIS COMPONENTS
NUMBER OF STATES REPORTING

	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
3. Computer too crowded	0	0	1	2	0	0	2
Total	0	1	12	12	0	0	16
EDP Software							
1. Limited data access software capability	2	0	2	10	0	0	11
Total	2	0	2	10	0	0	11
Data Base							
1. Manpower data aggregation not useful to SDVE	1	0	1	1	0	1	2
2. Inaccurate manpower data	2	0	0	0	0	2	2
3. Poorly formatted manpower data	0	0	0	1	0	1	2
4. Untimely manpower data	0	0	0	0	0	1	1
5. Inadequate manpower data	1	0	0	0	0	1	1
6. Inconsistent codes prevent file integration	0	0	0	1	0	0	1

Table 9 (Continued)

CONSTRAINTS IMPACTING ON MIS COMPONENTS
NUMBER OF STATES REPORTING

	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
7. File and enrollment data can't be used to assess program effectiveness	0	0	0	0	0	1	1
8. Infrequent updating of manpower data	0	1	0	0	0	0	1
Total	0	1	0	0	0	0	1
Funding							
1. Insufficient funds	6	1	1	0	0	0	8
Total	6	1	1	0	0	0	8
EDP Technical							
1. Limited physical access to computer	0	0	0	1	0	0	1
2. Poor hardware capability	0	0	1	1	0	0	2
Total	0	0	1	1	0	0	2

Table 9 (Continued)

CONSTRAINTS IMPACTING ON MIS COMPONENTS
NUMBER OF STATES REPORTING

	MIS Component						
	System Wide	Input Component	Data Processing Component	Output Component	Documentation Component	Utility of the System	Total
Reports							
1. Generation of timely reports is difficult	0	0	0	0	0	1	1
2. Can't monitor expenditures on time	0	0	0	0	0	1	1
3. Reports not used by LEAs	0	0	0	0	1	1	2
4. MIS output not used for management decisions	0	0	0	0	1	1	2
Total	0	0	0	0	1	3	4

Table 10

Constraints Reported by at least
10% of the States

Constraint	Constraint Category	No. of States Reporting	% of 43 States Reporting Constraints
Inadequate number of staff	Staff	20	47
Inadequate cooperation by LEAs	Organization	16	37
Unclear or contradictory definitions	Data Collection	11	26
Limited data access capability	EDP Softward	11	26
Poor computer center service	EDP Services	9	21
Low priority on the computer	EDP Services	9	21
Insufficient funds	Funding	8	19
Inadequate support by SDVE administration	Organization	8	19
Limited physical access to the computer	EDP Hardware	5	12

26% of all of the states (11 of 43) reported definitional problems as the two major constraints to improving data input.

Constraints to Improving the MIS Data Processing Component

Summary of findings

- the most frequently reported constraints to improving the MIS data processing component were poor computer center services (9 states) and low priority on computer for SDVE purposes (9 states)
- only 2 states reported that limited data access capabilities would be a constraint to improving the MIS data processing component
- twenty-four (56%) out of the 43 states reporting 1 or more constraints reported no constraints to improving the MIS data processing component.

Analysis of the data

Nineteen states (44%) reported a total of 11 constraints which would impact on improving the MIS data processing component. The 11 constraints were distributed fairly evenly across 6 of the 9 categories of constraints. Only EDP services constraints were expressed by any large number of states. In this instance a total of 12 states reported poor computer center services and/or low priority on the computer constrained improving MIS data processing. From another perspective, 28% of all of the states (12 of 43) reported inadequate EDP services as a constraint to improving the MIS data processing component.

Constraints to Improving the MIS Data Output Component

Summary of findings

- EDP services constraints, i.e., poor computer center service, low priority on the computer, and computer too crowded, represented the most frequently expressed constraints to improving the MIS data output component (12 states)

- almost as frequently reported as a constraint to improving the MIS data output component was limited data access capability (10 states)
- twenty (47%) of the 43 states reporting 1 or more constraints of some kind reported no constraints to improving the MIS data output component.

Analysis of the data

Twenty-three states (53%) reported a total of 15 different constraints impacting on improving the MIS data output component. Ten of these states (43%) reported a limitation in data access capabilities because of available computer software. Twelve of these states reported one or more constraints associated with EDP services. Seven states reported they were constrained by a low priority on the computer available to them, 6 states reported generally poor computer center services, and 2 states reported the computer available to them was often too crowded. The remaining 11 states reported constraints that were distributed across 5 of the remaining 7 constraint categories. In this instance no single constraint was reported by more than 3 states.

From another perspective, 23% of all of the states (10 of 43) reported that limitation in data access capabilities would impact on the MIS data output component, while 28% of all states (12 of 43) reported some form of EDP services constraint to this component.

Constraints to Improving MIS Documentation, Training, and Assessment Components

Summary of findings

- no state reported any constraints impacting on improving MIS assessment or training
- only 1 state reported any constraint to improving MIS documentation
- forty-two (98%) of the 43 states reporting 1 or more constraints reported no constraints to improving the MIS support function component.

Analysis of the data

One state reported inadequate number of staff would be a constraint to improving MIS documentation. This was the only constraint identified by any state which would impact on improving the three MIS support functions.

Constraints to Improving MIS Utility

Summary of findings

- externally generated manpower data constraints were reported as the most frequent group of constraints to improving MIS utility (5 states)
- thirty-three (77%) of the 43 states reporting 1 or more constraints reported no constraints to improving MIS utility.

Analysis of the data

Ten states (23%) reported a total of 12 constraints which would impact on improving MIS utility to its users. Six constraints were related to the data base, of which 5 dealt with manpower data, 4 constraints were related to report generation (e.g., timing and utility to users), and 2 constraints were staff related. The 5 most frequently reported constraints, those dealing with manpower data, were reported by 5 of the 23 states and by 12% of all 43 states.

Conditions External to the MIS that Impacted on MIS Implementation, Administration and Operations

Summary of findings

- the most frequently reported conditions external to the MIS that impacted on improving MIS implementation, administration and operations were inadequate number of staff (15 states), inadequate support by SDE and SDVE administration (10 states), and insufficient funds (6 states)
- twenty (47%) of the 43 states reporting 1 or more constraints reported no external conditions acting as constraints to improving MIS.

Analysis of the data

Twenty-three states (53%) reported a total of 16 organizational, funding, and staffing constraints which would impact on improving MIS implementation, administration, and operations. Inadequate numbers of staff was reported as a constraint by 15 of the 23 states (65%). Two constraints, "inadequate, support by SDVE administrators" and "inadequate support by SDE administrators" were reported by 10 of the 23 states (43%). Insufficient funds was a constraint to improving MIS implementation, administration, and operations for 6 of the 23 states (26%). Twelve additional constraints were reported, and in each case, by 3 or fewer states.

From another perspective, 37% of all the states (16 of 43) reported staffing constraints, 43% of all states (14 of 43) reported organizational constraints, and 14% of all states (6 of 43) reported that insufficient funds would impact on improving general MIS implementation, administration, and operations.

Additional Findings About Constraints to Improving MIS as Reported by the States

Summary of findings

- nine constraints identified in this study were reported by 5 or more of the 43 states reporting constraints
- four of the 9 most frequently reported constraints to improving MIS are related to data processing. Four of the other 9 constraints deal with organizational, staffing, and funding matters. One of the 9 constraints is a data collection issue.
- twenty-nine (57%) of the 51 constraints identified in this study were reported by only 1 state each
- forty-two (82%) of the 51 constraints identified in this study were reported by 4 or fewer states each.

Analysis of the data

Table 10 lists the 9 constraints to improving MIS; each of which was reported by 10% or more of the states.

Additional Findings About Constraints as Inferred by the Study's Interviewers

Summary of findings

- constraints perceived by the states to improve MISs, while probably real, do not in themselves explain why more states have not achieved greater MIS comprehensiveness and adequacy as these terms are defined by the study
- there appears to be no generally accepted standards for use by states in defining a comprehensive or adequate MIS
- states have different intended purposes for their systems
- there is a need for many MIS managers to have more information about recent developments in MIS technology and for them to become more aware of how this technology provides alternatives in conceptualizing and operating MISs.

Analysis of the data

This chapter detailed the major findings about constraints to improving currently operative MISs which were reported by the states. Presumably, the elimination or reduction of these constraints should enable many states to improve MISs in whatever terms they perceive improvement to be. However, the interviews suggested that elimination or reduction of the constraints reported by the states would probably not in itself lead to more comprehensive or adequate MISs (as defined by the study) being developed by the states. Indeed, many states report so few constraints currently to their MIS (29 report only 1) that other factors are required to explain why many more states do not currently operate more comprehensive and adequate systems.

In the course of the interviews, it was found that many states had purposes for MISs that would not lead to more adequate or comprehensive MISs as defined by the study. Several of the most adequate states reported they were generally satisfied with their MIS and the improvements they intended for the system were relatively minor ones. No state reported any con-

straints to improving MIS training and assessment components and only 1 state saw constraints to improving system documentation. No state had adequate training or assessment, and few states even approached adequate standards for system documentation. Yet, when states described MISs or discussed constraints, these three system support functions were given a low, if not unrecognizable, priority for future MIS improvement efforts.

Another impression gained through the interview process was that MIS managers were preoccupied with effectively maintaining the pace of ongoing MIS operations. This might account for the fact that many of them were unaware of very recent developments in MIS technology and the impact of these developments on MIS conceptualization. For example, many MIS managers were unaware of generalized information retrieval systems or generalized data base management systems software technology and its implications for improving the limited data access capabilities reported by many states. In other instances, MIS managers devoted considerable attention to how they were attempting to improve one or two MIS components (principally data input and data processing), but the consequences to the overall MIS of integrating the two components did not surface in the interviews.

Chapter V

RECOMMENDATIONS TO USOE

The management of vocational education at the state level requires that an extensive data base be available to administrators to enable them to formulate policies, plan for the redirection of vocational education programs, monitor ongoing efforts in operation in local school districts, and report on the status of vocational education to external agencies and the public. States utilize management information systems to collect, organize, and retrieve the data they require to manage vocational education. In spite of numerous efforts to improve state MISs, USOE and the states have been periodically criticized for a failure to implement management information systems that are sufficiently comprehensive and adequate for producing needed management useful information.

The recommendations that follow are based on study data and are compatible with the intent and mandates of P.L. 94-482 that states use more data-based information to plan and evaluate state vocational education programs. These recommendations, if implemented, will have the effect of improving current MIS capabilities of state divisions of vocational education. These recommendations are directed to USOE since that agency is in a unique position to assist states to upgrade their current MIS. This is because USOE can marshall the extensive resources and the pool of talents that are required to achieve a national impact on the overall problem. Recommendations for dealing with perceived constraints to improving MIS are listed first. Then, recommendations are presented for improving MIS features.

Recommendations for Dealing with Inadequate Numbers of MIS Staff

USOE should consider:

. Initiating actions to have performance-based competency profiles developed for use by states in recruiting new MIS staff and for assisting states to identify professional development needs of MIS personnel.

- Sponsoring professional development workshops for participation by state level administrators for MIS staff, and USOE regional office staff involved with state plans and accountability reports, that focus on MIS technology and the uses of information in the management of vocational education.
- Promoting and supporting joint efforts with states for a planned system of inter-and intra-state exchanges of MIS staff persons as a means of providing these persons with a better awareness of current MIS developments and as a means of improving their existing professional skills.
- Commissioning and supporting the publication of periodic reviews and syntheses of literature dealing with educational MIS and encouraging the states to disseminate reports of their MIS activities and developments.
- Developing a program to disseminate the outcomes of federally funded MIS projects that have applicability and potential usefulness to the states.

The states' most frequently reported constraint to MIS improvement was "inadequate numbers of MIS staff." The study findings suggest that while in some instances hiring more staff might be a way to improve some state MISs, developing the skills of current staff might be a more practical, cost-effective means of attaining this goal. At a time when state divisions of vocational education are concerned with economy of operations better utilization of existing staff through professional development activities might be a more viable option than increasing staff size.

Recommendations for Dealing with Inadequate Cooperation by Local Education Agencies

USOE should consider:

- Initiating feasibility studies to determine if it is practical for states to implement more automated alternatives to the current practice of local schools manually completing state-initiated data collection instruments.

- Initiating studies, in cooperation with states to determine the most appropriate schedules for collecting various kinds of data for input into state MISs that will have the least impact on local level data suppliers and will still provide adequate management useful information for the multiplicity of purposes for which information is needed.
- Initiating studies to determine how states of diverse size can use sampling methods to reduce the volume of data collection.

"Inadequate cooperation by local education agencies" was perceived by many states as a major constraint to upgrading MIS data bases. The central reasons given for inadequate level of cooperation was the significant costs and time required of many local schools to comply with state and federal data requests. A few respondents in the study voiced concern that some local school districts were reassigning their positions with regard to accepting federal funds because the extensive bookkeeping and data collection problems associated with such funding might outweigh the benefits from accepting these funds.

Recommendations for Dealing with Unclear of Contradictory Definitions of Terms

USOE should consider:

- Developing a set of uniform terminology and data element definitions that are required for numerical aggregation and comparability of data within and across states.
- Seeking counsel from individuals representing local and state educational agencies whenever changes in uniform terminology and data element definitions are contemplated.

  Recommending to the National Association of State Directors of Vocational Education that it reconvene a panel to deal with the issue of uniform data definitions and terminology.
- Periodically assessing the adequacy of uniform terminology and data element definitions as these are implemented by the states. USOE regional office staff might coordinate this assessment activity within each region.

- Convening a series of meetings to include staff from USOE, the National Center for Educational Statistics (NCES), and the states to seek solutions to issues resulting from incompatibilities in instructional program codes (e.g., USOE and HEGIS) and instructional and occupational classification codes.

"Unclear or contradictory definitions of terms" was the third most frequently reported constraint associated with improving state MISs. A lack of agreed upon terms and definitions leads to a garbage-in-garbage-out effect whereby neither the state nor the USOE can be sure of the reliability or validity of much of the data aggregated from the local school district level. Definitional problems also impede the usefulness of occupational information in vocational education planning.

Recommendations for Dealing with Limited Data Access Capability

USOE should consider:

- Commissioning publications that can enable state MISs staff to become better acquainted with the range of computer software technologies available to them, their requirements, and criteria that can be used to select among available packages.
- Funding, in collaboration with the states, periodic meetings for MIS technical staff for the purpose of information exchange about data management (e.g., computer software, operating environments, implications for the management and utility of data bases).

"Limited data access capability" was reported as a constraint to improving MIS by at least one quarter of the states involved in the study. Although many proprietary file management and data base management computer software packages are available that have varying inquiry and update capabilities, most states continue to rely on in-house developed, output-oriented software. While this in-house developed software might be adequate or nearly so for use in compliance oriented MIS, it is almost certain that these will not be adequately responsive for MIS that are designed for multiple management purposes.

A Recommendation for Assisting States
to Implement More Comprehensive Data Bases

USOE should consider:

- Initiating meetings to involve the states, NCES, and USOE in cooperative efforts to determine how best to phase in those data base categories found to be absent from most state MISs (e.g., facilities and program costs) and that states are required to have in place in order to be responsive to the Vocational Education Data System (VEDS) as mandated under P.L. 94-482.

Many states will find it difficult, if not impossible, to implement one or more data base categories expected to be required for reporting to USOE by October 31, 1977. Even if technical amendments to P.L. 94-482 permit extending the time of implementation for one year the problems faced by many states in collecting such information will not be resolved by time alone. Thus, there is a need to cooperatively define the issues and evolve solutions to these issues.

A Recommendation for Assisting States
to Upgrade MIS Support Components

USOE should consider:

- Funding the development and field testing of prototype standards and formats for documenting and assessing state MISs and prototype guides for training state staff in utilizing the MIS.

The present study determined that the states have devoted the least attention to the MIS support components of documentation, training, and assessment. While there are defensible reasons for this, system continuity, usefulness, and improvement over time require that these system support functions be given attention by both USOE and the states.

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APPENDIX A

Panel of Consultants Assisting in Developing a Scheme to Describe a Comprehensive MIS

Panel of Consultants Assisting
in Developing a Scheme to
Describe a Comprehensive MIS

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APPENDIX B

State Divisions of Vocational Education
Participating in the Study

State Divisions of Vocational Education
Participating in the Study

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Illinois
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massacnusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washintgon
West Virginia
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APPENDIX C

Interviewers Assisting With Data Collection at Regional Sites

Interviewers Assisting With
Data Collection at Regional Sites

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APPENDIX D

Letter to States Describing
Interview Procedure

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Interview Procedure

The purpose of this document is to describe in detail the substantive nature of the interview we will be conducting with you relative to the State Management Information Needs Study project.

Planning for the Study

Our project staff enlisted the services of a group of consultants with expertise in MIS and vocational education management to produce a framework for collecting data about MIS in terms of comprehensiveness and utility, and potential operational constraints to improving MIS operations. The concensus reached has been the basis for plans for the data collection described below.

In selecting data collection strategies we felt it important to provide respondents with the opportunity to adequately describe their state's MIS. To do this it was decided to deal directly with you using an open-ended interview technique in order to elicit the most indepth and broad-based picture of your ongoing MIS efforts.

With this background let me describe the interview procedures more specifically as this will enable you to organize some of your thoughts in advance.

Introduction

First, we will ask you to describe how your MIS operation fits into the overall organization of the state agency.

Data Input and Output

Next we will ask about the categories of data in the MIS and their sources, and about the schedules for data collection. We would also like to know about any problems you are encountering or have encountered with respect to data identification and collection and about any changes in your data base over the last few years. Next it would be helpful to have you describe the most useful or significant features of the MIS data base, data collection procedures, and MIS instrumentation.

At this point we will discuss the types of reports e.g., transaction, exception/profile, analytic, generated by the MIS, and who are the users of these reports, and any problems encountered with report generation. Then, we would like to know about the types of reports which you find to be especially helpful to management.

Data Management

Information about computer software and hardware used in support of the MIS will include:

a. Hardware and software facilities used by your MIS
b. Hardware and software facilities readily available to, but not used by, your MIS
c. Operating characteristics of your computer facility
d. Organization of your MIS data base
e. Methods and procedures that you use to retrieve information from your MIS data base
f. Information about EDP personnel

Next it will be useful to know if you are satisfied with your current computer software and hardware, what changes have occurred, if any, over the past few years, and about any difficulties or "horror stories" you might have about the effects of computer software or hardware development and utilization on system costs, information generation, etc.

System Support Functions

We will inquire next about any documentation, training, and assessment that are utilized in the operations of your MIS. If you have any successful (or unsuccessful) experiences with these system support functions we would like to know about them. It would also be helpful to know what you believe to be important needs in this area that deserve general attention.

Part C Project

At this point in the interview we will inquire about your Part C proposal efforts. What we are especially interested in knowing about are: a) the current status of your efforts; b) the actual and/or anticipated outcomes of your Part C MIS and/or manpower project(s); and c) any benefits to the MIS or the SDMS that have resulted or are expected to result from this Part C funding. We are trying to determine what actual or anticipated changes in MIS capabilities have occurred or are expected to occur as a result of Part C federal assistance to the states.

General Information

Lastly, we would like to get an overall impression of the strengths of your MIS and what you perceive to be the next steps that need to be taken to upgrade the system (assuming the availability of time and resources).

Interview with Management Person

As a follow-up to our interview we will address several questions by phone to a senior member of the state staff who is not directly part of the MIS staff. This person should be either the state director or one of his key assistants such

as a director for planning and evaluation or a person with overall management supervision for MIS. We would appreciate your identifying this person and briefing him or her about the project and the nature of the telephone inquiries. Two basic questions will be addressed. The first question is "what do you perceive as major constraints or problems associated with improving the MIS capabilities within your organization?" The second question is "as a consumer of data and as a person concerned with data-based information are there any ways that MIS outputs might be more user-oriented?" We will, for example, inquire as to additional categories of data and reports that might be useful, and whether there are needs to reduce timelags between the initiation of data base inquiries and the availability of reports.

The intent of involving management is not to verify anything you have told us. Rather, we want to know if there are any areas of general concern to these MIS consumers (whose perspective might be different from a MIS manager) which we should be alert to when developing our analysis of common constraints to system upgrading and our recommendations to BOAE regarding steps they might consider in future assistance to the states.

APPENDIX E

Panel of Consultants Assisting in Formulating Recommendations to USOE

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